

## CLAIMS

1. A wireless communication apparatus comprising:

a subcarrier number determining section determining  
a number of subcarriers, of all subcarriers within a  
5 communication band, to be allocated to each communicating  
party in such a manner as to achieve a transmission rate  
required by each communicating party;

a first transmission section transmitting  
information for the number of subcarriers determined by  
10 the subcarrier number determining section to each  
communicating party; and

an allocation control section selecting subcarriers  
allocated with packet data every communicating party  
based on required transmission rate information for each  
15 communicating party and channel quality information for  
the number of subcarriers for each communicating party  
extracted from the received signal.

2. The wireless communication apparatus according to  
20 claim 1, wherein the subcarrier number determining  
section takes the number of subcarriers allocated to be  
all of the subcarriers within the communication band for  
communicating parties where the amount of data for the  
channel quality information of subcarriers selected by  
25 communicating parties and subcarrier identification  
information indicating subcarriers selected by  
communicating parties is larger than an amount of data

for channel quality information for all of the subcarriers within the communication band.

3. The wireless communication apparatus according to  
5 claim 1, wherein the subcarrier number determining  
section determines the number of subcarriers by  
multiplying the number of subcarriers allocated by the  
allocation control section for one frame previous with  
a predetermined constant, for communicating parties where  
10 subcarriers are allocated by the allocation control  
section for one frame previous to the current frame, and  
the first transmission section sends information  
for the number of subcarriers determined by the subcarrier  
number determining section in the current frame.

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4. The wireless communication apparatus according to  
claim 1, wherein the subcarrier number determining  
section obtains the number of subcarriers in accordance  
with equation (1):

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$$S_k = \lceil \alpha \times R_k / r \rceil \dots (1)$$

where  $S_k$ : subcarrier number (where  $k$  is a user number  
that is a natural number of 2 or more),

$\alpha$ : first constant,

$R_k$ : required transmission rate of communicating  
25 party (where  $k$  is user number and is a natural number  
of 2 or more),

$r$ : transmission rate for one subcarrier while

employing modulation coding schemes having a highest transmission rate or having a transmission rate for one subcarrier while using modulation coding schemes satisfying a required packet error rate using a channel quality value of a value that is a sum of average signal to noise ratio and a second constant, and

$$\lceil \alpha \times R_k / r \rceil : \text{integer larger than } (\alpha \times R_k / r).$$

5. The wireless communication apparatus according to claim 1, wherein the subcarrier number determining section obtains the number of subcarriers in accordance with equation (2):

$$S_k = \lceil (\beta \times R_k \times N) / (R_1 + R_2 + \dots + R_k) \rceil \dots (2)$$

where  $S_k$ : subcarrier number (where  $k$  is a user number that is a natural number of 2 or more),

$\beta$ : constant,

$R_k$ : required transmission rate of communicating party (where  $k$  is user number and is a natural number of 2 or more),

$N$ : Total number of subcarriers, and

$$\lceil (\beta \times R_k \times N) / (R_1 + R_2 + \dots + R_k) \rceil : \text{integer larger than } ((\beta \times R_k \times N) / (R_1 + R_2 + \dots + R_k)).$$

6. A communication terminal apparatus communicating with the wireless communication apparatus according to claim 1, wherein the communication terminal apparatus comprises:

a subcarrier selection section selecting subcarriers of the number of subcarriers using information for the number of subcarriers extracted from the received signal in order of good reception quality;

5 a channel quality information generating section generating the channel quality information for subcarriers selected at the subcarrier selection section; and

10 a second transmission section transmitting the channel quality information generated by the channel quality information generating section.

7. A base station apparatus equipped with the wireless communication apparatus according to claim 1.

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8. A subcarrier allocation method comprising the steps of:

determining a number of subcarriers, of all subcarriers within a communication band, are to be allocated to each communicating party in such a manner as to achieve transmission rates required by each communicating party;

20 transmitting information for a determined number of subcarriers to each communicating party; and

25 selecting subcarriers allocated with packet data every communicating party based on required transmission rate information for each communicating party and channel

quality information for the number of subcarriers for each communicating party extracted from the received signal.

- 5 9. The subcarrier allocation method according to claim 8,

wherein the number of subcarriers allocated is taken to be all of the subcarriers within the communication band, and information for the number of subcarriers for  
10 all of the subcarriers is transmitted, for communicating parties where the amount of data for the channel quality information of subcarriers selected by communicating parties and subcarrier identification information indicating subcarriers selected by communicating parties  
15 is larger than an amount of data for channel quality information for all of the subcarriers within the communication band.

10. The subcarrier allocation method according to claim  
20 8, wherein the number of subcarriers is determined by multiplying the number of frames allocated to one frame previous to the current frame with a predetermined constant for communicating parties where subcarriers are allocated one frame previous to the current frame, and  
25 information for the number of subcarriers is transmitted.